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**UNCLASSIFIED INFORMATION ON SOVIET
BLOC INTERNATIONAL GEOPHYSICAL COOPERATION
-1960**

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INFORMATION ON SOVIET BLOC INTERNATIONAL GEOPHYSICAL COOPERATION - 1960

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INFORMATION ON INTERNATIONAL GEOPHYSICAL COOPERATION --

SOVIET-BLOC ACTIVITIES

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I. GENERAL

Academy of Sciences Hears Provocative Reports on Glaciology and Paleomagnetism

The general meeting of the Academy of Sciences of the USSR was preceded by meetings of its constituent divisions. At these meetings candidates were proposed as Active and Corresponding Members of the Academy.

In the Division of Geological and Geographical Sciences G. A. Avsyuk, Corresponding Member of the Academy, delivered a report on glaciological research during the IGY period. The USSR, like the United States, had 17 glaciological stations in operation, 6 in Antarctica and 11 on its own territory. He reported that the first processing of the field observations should be completed this year. It can already be stated, he declared, that the total mass of ice involved in present-day glaciers has been grossly underestimated in the past; it is now estimated to be equivalent to 30 million cubic kilometers. This volume of ice would be capable, if melted, of raising the level of the world ocean by about 70 meters. It is also evident, he concluded, that present-day glaciation is in a stage of retreat at all points on the globe, although the rate of retreat differs considerably from place to place.

A report entitled "Paleomagnetism and its Meaning for Stratigraphy and Geotectonics," was delivered by P. N. Kropotkin, Doctor of Geological-Mineralogical Sciences. He observed that in recent years there has been a considerable increase in the study of paleomagnetism. This is because paleomagnetic research can tell us the magnetic latitude approximately corresponding to the geographical latitude at which a particular part of the Earth's crust was situated during the formation of the rock. A comparison of the paleomagnetic data shows that the position of the continents in relation to the poles and to one another has changed considerably in the course of geologic time. Periodic inversions occur in which the Earth's magnetic axis turns by 180° in such a way that the north geographic pole alternately coincides with the Earth's north and south magnetic poles. Paleomagnetism makes it possible to make a detailed correlation of the geological age of sedimentary deposits. The paleomagnetic method of correlation as proposed by A. N. Khramov will be of great importance for the exploration of deposits of gas and petroleum. (Abstract of "At the General Meetings of the Divisions of the Academy," Vestnik Akademii Nauk SSSR, No 8, 1960, pp. 35-36)

Two New Scientific Institutes Organized by Academy of Sciences USSR

The Presidium of the Academy of Sciences USSR has decided to organize two new institutes. These are the Siberian Institute of Terrestrial Magnetism, the Ionosphere and Radiowave Propagation which

will be established within the framework of the Siberian Branch of the Academy, and the Polar Geophysics Institute within the Kola Affiliate of the Academy of Sciences USSR imeni S. M. Kirov.

The Siberian Institute will be built on the base of the Irkutsk Magneto-Ionosphere Station and the Irkutsk Zonal Bureau of Radio Transmission Forecasts. The work of the Institute will be the study of terrestrial magnetism, the ionosphere and radiowave propagation and of solar activity and related phenomena in the territory of Siberia and the Far East, and the provision of magneto-ionosphere service for radio transmission forecasts in this territory for scientific purposes and for better servicing the needs of production and scientific organizations. The structure of the Institute as approved will consist of 5 laboratories (terrestrial magnetism and electricity, ionosphere studies, radiowave propagation, solar studies, cosmic rays), a design bureau, workshops, libraries and a network of stations.

The Polar Geophysics Institute is being created with the aims of uniting the geophysical investigations being conducted on the Kola peninsula by Institutes of the Academy of Sciences USSR and ensuring the future development of this work. The Institute will be established on the base of the local division of the Institute of Terrestrial Magnetism, the Ionosphere and Radiowave Propagation, the Lovozero Station of the Institute of the Physics of the Earth, and the "Apatity" seismic station. The Institute's principal duties are to make detailed studies of the phenomena of terrestrial magnetism, the auroras, cosmic rays, the ionosphere and radiowave propagation in the high latitudes; the development and improvement of the methods of studying electromagnetic phenomena in the upper atmosphere applicable to the peculiarities of the high latitudes; the servicing of organizations of the national economy with radio transmission forecasts, geomagnetic and other data within the scope of the Institute's activities; the conduct of methodical and production works connected with mineral prospecting. S. I. Isayev, Candidate of Physico-mathematical Sciences was appointed to carry out the duties of the director. ("On the organization of the Siberian Institute of Terrestrial Magnetism, the Ionosphere and Radiowave Propagation," and "On the Organization of the Polar Geophysics Institute"; Moscow, Vestnik Akademii Nauk SSSR, No 8, 1960, p. 117)

Conference on Heliogeophysics

An interdepartmental conference on the generalization of investigations in the field of heliogeophysics was held in Leningrad from 8 to 11 February 1960. Taking part in the conference were astronomers, geophysicists, biologists, climatologists, hydrologists, oceanologists and other specialists working in Moscow, Leningrad, Kiev, Voronezh, Yalta, Sochi and other cities. About 30 reports and papers were delivered at the conference. (Conference in the Field of Heliogeophysics," by I. Ye. Buchinskiy, Moscow, Izvestiya Akademii Nauk SSSR, Seriya Geofizicheskaya, No 8, 1960, pp. 1287-1288)

New Astrophysical Observatory

The Shomakha Astrophysical Observatory is among the newly organized scientific institutions recently announced by the Presidium of the Academy of Sciences, Azerbaydzhan SSR. The observatory is located in the eastern part of Azerbaydzhan, one of the southern-most republics of the USSR. ("Discussion of the Activities of the Academy of Sciences Azerbaydzhan SSR"; Moscow, Vestnik Akademii Nauk SSSR, No 8, 1960, p. 111)

Collection of Articles on IQY Operations at Leningrad University

A collection of articles and materials generalizing the first results of the work conducted by associates of Leningrad University according to the International Geophysical Year Program was recently published under the title Mezhdunarodnyy geofizicheskiy god by the Publishing House of the University of Leningrad.

The book contains information describing the conditions for the observation of noctilucent clouds and it presents data on the work of the Time Service and on studies on various problems of atmospheric physics. In addition, it contains materials gathered by the complex expedition on geomorphology, hydrology and climatology.

The book is intended for scientific workers and aspirants working in the fields of astronomy, geophysics and geography.

A translation of the table of contents follows.

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(Mezhdunarodnyy geofizicheskiy god, Professor K. Ya. Kondrat'yev, editor-in-chief; Leningrad, 1960, 223 pages, illustrated)

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II. ROCKETS AND ARTIFICIAL EARTH SATELLITES

Soviets Discuss Possible Uses of Nuclear Photo-Emulsions in Space Research

Until now space research has been limited because only such data reached the Earth as could be transmitted by radio; a recent Pravda article points out that with the return of the second spaceship the possibilities of space research have been immeasurably enhanced.

A feature article in the 31 August 1960 issue of that newspaper is devoted to a research method involving the use of nuclear photo emulsions developed by the Soviet physicists L. V. Mynovskiy and A. P. Zhdanov.

Briefly, this method is based on the fact that any rapidly moving charged particle leaves a trace on the specially prepared photo emulsion in the form of individual grains; after development of the photo plate they appear as small dark spots on a bright background. The greater the electrical charge of the particle or the more slowly it moves, the closer these grains will be to one another and the denser and darker will be the trace left on the photo emulsion.

The authors then describe what has been accomplished by the use of this method in the past and then proceed to a discussion of the immense possibilities it now offers when the emulsions can be received after travelling through space. They discuss the properties and importance of cosmic rays and the new possibilities which the above method offers for studying this phenomenon. They also explain why these rays must be studied from a space vehicle, rather than from a terrestrial observation point.

Instruments with nuclear photo emulsions were carried aboard the second spaceship for the study of primary cosmic radiation and the interaction of primary cosmic particles with atomic nuclei. These photo emulsions are now being studied in the laboratory.

The article also briefly mentions other instruments carried aboard the spaceship for measurement of solar ultraviolet and soft Roentgen radiation and explains the importance of these phenomena and their measurement. ("In the Depths of the Microworld," by S. Vetrov, Corresponding Member of the Academy of Sciences, and Professor N. Grigorev, Pravda, 31 August 1960, p. 4)

Ukrainian Periodical Carries Article on Problems of Man in Space

An article recently appearing in the Ukrainian-language popular science publication Nauka i Zhittya deals with the physical and psychological problems involved in the sending of a manned space vehicle on an interplanetary flight. It presents no material which has not appeared frequently in Russian-language periodicals. ("Man Into Space," by V. I. Cherednichenko, Nauka i Zhittya, No 8, 1960, pp. 12-16)

Popular Science Brochure on a Photon-powered Spaceship

A recently published, popular science booklet, Fotonnyy zvezdolet [A Photon-powered Starcraft] by Yuriy I. Sokolovskiy, docent, and Vasilii I. Shilov, engineer, examines the prospects of accomplishing space flights beyond the limits of the solar system to distant stars and extragalactic nebulae.

The physical principles on which the operation of a photon rocket -- the interstellar ship of the future -- are based are explained, the weight of light, its pressure and luminous emission, antimatter, the laws of the theory of relativity, and other subjects are discussed.

The booklet is intended for a wide circle of readers who are interested not only in the present but also future prospects of scientific-technical progress. (Fotonnyy zvezdolet, by Yu. Sokolovskiy and V. Shilov; Khar'kov, 1960, 46 pages, illustrated)

III. UPPER ATMOSPHERE

Observations of Auroras with a Photoelectric Spectrometer

Beginning in November 1959 the spectra of auroras have been recorded at the station "Loparskaya" by the use of a rapid-scanning photoelectric spectrometer. A diagram of the instrument's optical system is shown in Figure 1; the design of the instrument is also described textually. Regular observations of hydrogen emission in the $H\beta$ line have indicated that hydrogen emission is usually enhanced (200 rayleighs or more) in diffuse homogeneous arcs situated to the south of active forms of auroras or other arcs. A hydrogen emission was observed more than once in the absence of a visible aurora. ("First Observations of the Spectra of Auroras with a Photoelectric Spectrometer," by O. L. Vaysberg, Izvestiya Akademii Nauk SSSR, Seriya Geofizicheskaya, No 8, 1960, pp. 1277-1278)

Popular Booklet on 15 February 1961 Solar Eclipse

Solnechnoye zatmeniye v 1961 godu (Solar Eclipse in 1961) by Professor Pavel Ivanovich Popov is the latest issue in a series of popular-type booklets published by the Moscow publishing house, Znaniye.

The book explains the reasons for solar eclipses and examines the conditions in which the 15 February 1961 solar eclipse will take place. A map is included which shows the track of the eclipse across the Soviet Union, the zones of partial and total eclipse, the time of the beginning and ending of the eclipse, and the degree to which the solar disk is covered by the Moon.

The book is intended to be used by lecturers as a basis for talks and lectures in propagating the true natural reasons for eclipses and combatting ignorance, superstition and religion. ("Solnechnoye zatmeniye v 1961 godu," by P. I. Popov; Moscow, 1960, 32 pages, illustrated)

IV. METEOROLOGY

Abstracts of Articles on Meteorology from the "Izvestiya" of the Academy of Sciences of the USSR, Geophysical Series, No. 8, 1960

The latest available issue of the Izvestiya Akademii Nauk SSSR, Seriya Geofizicheskaya (No. 8, 1960), contains the following four articles of interest to meteorologists:

- 1) "Some Problems of Radiational Heat Exchange in Stratus Clouds," by Ye. M. Feygel'son, pp. 1238-1245.

Ye. M. Feygel'son of the Institute of Physics of the Atmosphere explains the role of individual factors in the process of radiant heat exchange in clouds. He examines the reflection of long-wave radiation from clouds, the absorption of solar radiation in clouds, and the turbulent transfer of heat for a variable coefficient of exchange.

- 2) "On the Variability of Several Parameters Used for Computation of Currents of Scattered Radiation," by M. S. Malkevich and K. S. Glazova, pp. 1246-1251.

The authors of this article use the results of the solution of an equation for radiational transfer to investigate the dependence of parameters encountered in differential equations for currents of radiation on the optical properties and conditions of illumination of the atmosphere.

- 3) "Measurement of Frequency Spectra of Temperature Pulsations in the Near-Surface Layer of the Atmosphere," by L. R. Tsvang, pp. 1252-1262.

This well illustrated and well documented article describes an apparatus (pulsation microthermometer and low-frequency spectrum analyzer) used for measurement of the spectra of temperature pulsations T' ; he gives the results of such measurements. A comparison of the results of these measurements with the results of gradient structural measurements yields an experimental confirmation of the theory of similarity and the hypothesis of "frozen" turbulence for T' . The author has derived experimental confirmation of the correctness of the " $2/3$ law" for T' in a wide range of Richardson numbers.

- 4) "Prediction of the Field of Atmospheric Pressure at the Mean Level of the Atmosphere with Due Consideration of Horizontal Large-Scale Turbulent Mixing," by S. V. Nemchinov, pp. 1271-1276.

The author, a worker at the Institute of Applied Geophysics of the Academy of Sciences, presents a highly sophisticated mathematical approach to the prediction of the field of atmospheric pressure at the mean level of the atmosphere. He also proposes a somewhat different method for the solution of the same problem. The selection of the best method for such computations can be made after the accumulation of considerable factual data; the use of a high-speed electronic computer is recommended.

Abstracts of Papers Presented at the First Scientific Conference on Problems of the General Circulation of the Atmosphere

The First Scientific Conference on Problems of the General Circulation of the Atmosphere was held in Moscow in March of this year. A total of about forty papers were presented. The following are abstracts of the short summaries of a few of these papers published recently in Znanije-Sila.

1. "Air Swings," by Academician V. V. Shuleykin.

Researchers at the Black Sea Division of the Marine Hydrophysical Institute have discovered that winds of gale force arise in the Crimea as a result of the uneven heating of the coast and shore, but until now have been unable to explain the force of the wind. Theoretical computations would indicate that the wind velocity should be considerably less than it is. The explanation of this phenomenon in the Crimea and elsewhere (notably on the west coast of Africa) is ingeniously explained by Shuleykin, who attributes it to a phenomenon which he terms "air swings" and which he describes in adequate detail to permit an evaluation of his theory.

2. "Sun -- Air -- Water," by A. L. Kats, Candidate in Geographical Sciences.

Much has been written about the lowering of the level of the Caspian Sea, but it has never been fully explained. The lowering of the Caspian, of course, is the result of changes in climate. Kats attributes these changes to variations in solar activity on 11-year and 80-90-year (secular) cycles. Nevertheless, the results of these variations are not uniform over large areas, but may vary greatly from region to region. Kats explains why this is so and applies the explanation specifically to the territory of the USSR. The theory of solar control of climate on our planet has possibilities for the making of long-range forecasts (several decades in advance).

3. "The Stratosphere Makes a Correction," by Professor Kh. P. Pogosyn.

Pogosyn reviews a wide range of facts about the general circulation of the atmosphere, but without introducing any new insights on this subject.

4. "The Collapse of the Wind Barrier," by P. D. Astapenko, Candidate in Geographical Sciences.

In order to explain a number of climatic phenomena on the Antarctic continent scientists have developed the theory of a "wind barrier" around Antarctica isolating the atmosphere of that continent from the atmosphere of the rest of the globe; they have also talked about mysterious pressure waves ("Simpson waves") which spread out over Antarctica independently of the movement of high and low pressure areas. IGY data, says Astapenko, shows that no "wind barrier" exists around that continent.

But, he adds, air constantly flows from the cold dome of Antarctica which changes its direction of movement under the influence of the Earth's rotation and does not always blow in accordance with the prevailing distribution of atmospheric pressure.

5. "Relief of the Atmosphere," by R. F. Usmanov, Candidate in Geographical Sciences.

This paper is a review of the influence exercised by the Earth's rotation on the general circulation of the atmosphere.
("World Weather," Znaniye-Sila, No. 8, 1960, pp. 4-6)

V. GRAVIMETRY

The Results of the Use of Highly Damped Gravimeters Aboard Aircraft

The author of an article appearing in the latest available issue of the Izvestiya of the Academy of Sciences of the USSR (Geophysical Series) describes the instruments used and the results obtained from gravimetric measurements made aboard planes in horizontal flight and hovering helicopters. A GAL gravimeter of the type used is shown in Figure 1. Figures 2 through 6 are reproductions of gravimeter recordings made under a variety of conditions; these recordings are interpreted in the text. ("Experience of Observations with Highly Damped Gravimeters on an Airplane and Helicopter," by Ye. I. Popov, Izvestiya Akademii Nauk SSSR, Seriya Geofizicheskaya, No. 8, 1960, pp. 1216-1218)

VI. GEOMAGNETISM

A Form of Interference During the Recording of Earth Currents

In a 200-word letter to the editor, published in the Izvestiya of the Academy of Sciences (Geophysical Series), S. I. Ryng describes a type of interference experienced during the recording of earth currents at Volozhin, White Russia. Investigations disclosed that the source of interference were components of a radio rediffusion station situated 800 m from the point where the instruments were installed. ("On One Form of Interference Observed During the Recording of Earth Currents," Letter to the Editor from S. I. Ryng, Izvestiya Akademii Nauk SSSR, Seriya Geofizicheskaya, No. 8, 1960, p. 1228)

VII. SEISMOLOGY

Abstracts of Articles on Seismology from the "Izvestiya" of the Academy of Sciences (Geophysical Series), No. 8, 1960

The August 1960 issue of the Izvestiya Akademii Nauk SSSR, Seriya Geofizicheskaya, has now been received. It contains the following three articles of interest to seismologists:

- 1) "Recording of Water Waves in the Vicinity of the Boundary of the Shadow Zone Formed by the Sea Bottom," by S. M. Sverey, pp. 1173-1186.

This well documented 14-page article discusses the properties of waves developing from refracted water waves from the point of exit of a ray touching the bottom of the sea. Experimental data on damping were compared with theoretical data computed for various models. On the basis of this comparison certain conclusions are drawn concerning the nature of the observed rays.

- 2) "Seismology in Yugoslavia," by F. I. Monakhov, pp. 1227-1228.

The territory of Yugoslavia is in a seismically active zone in which destructive earthquakes have repeatedly occurred. There are now four permanently active seismic stations in Yugoslavia (Belgrade, Zagreb, Ljubljana and Skoplje), and two stations are being organized (at Sarajevo and Titograd). All stations are equipped with mechanical seismographs. The Yugoslavian seismic service is without centralized control, stations are autonomous and each issues its own bulletin. There is only one seismologist at each station. The principal inadequacies of seismological science include the small number of stations, poorly developed recording procedures, the absence of a central administration, and a scarcity of seismologists.

This article provides additional information concerning Yugoslavian seismological institutions, publications and personalities.

- 3) "Miniature Illuminator (MO) for Tilt Meter and Seismic Recording," by A. N. Skur'yat, pp. 1220-1222.

This article describes a miniature illuminator for use with seismic instruments; it is accompanied by a photograph of the instrument and a cross sectional view of the illuminator along its optical axis. In addition to the commonly used achromatic lens there are two reflectors -- one flat and the other concave; these reflectors are the principal factor making possible a decrease in the size of the instrument. This new general purpose instrument is said to be superior in various ways to the commonly used K-VI illuminator.

VIII. OCEANOGRAPHY

Soviet Paper Discusses the Dissipation of Turbulent Energy and the Dimensionless Universal Constant in the "4/3 Law"

R. V. Ozmidov of the Institute of Oceanology of the Academy of Sciences of the USSR is the author of a recent article on the subject headlined above. He reviews data on the velocity of dissipation of turbulent energy ϵ in the sea. He proposes a method for determination of ϵ by using data relating to horizontal turbulent diffusion of discrete particles on the surface of the water. He demonstrates that the universal dimensionless constant in the "4/3 law" has a value on the order of 0.1, and not 1, as assumed earlier. ("On the Velocity of Dissipation of Turbulent Energy in Marine Currents and on the Dimensionless Universal Constant in the '4/3 Law'," by R. V. Ozmidov, Izvestiya Akademii Nauk SSSR, Seriya Geofizicheskaya, No. 8, 1960, pp. 1234-1237)

On the Presence and Characteristics of Microbes Locked in Ice

Professor B. I. Kleyn, Doctor of Medical Sciences, is the author of a brief article in a recent issue of the Soviet popular science magazine Znaniye-Sila dealing with microbes in the ice of the Arctic and Antarctic Regions, at sea and on the land. He reviews the research that has been done in this field in recent years in the Soviet Union and abroad and cites some of the striking conclusions drawn by several of these researchers, many of which still require confirmation. ("Microbes in the Ice," by B. I. Kleyn, Znaniye-Sila, No. 8, 1960, p. 13)

IX. ARCTIC AND ANTARCTIC

A New Soviet Brochure on the Political and Military Geography of Antarctica

A 54-page brochure on Antarctic problems has recently been published by the Leningrad Division of the Society for the Dissemination of Political and Scientific Knowledge. The author is Solomon Borisovich Slovien, Candidate in Economic Sciences. The book is without illustrations and contains only one sketch map; 6,300 copies of the brochure were printed.

The contents are broken down under four headings: "Antarctica -- a Laboratory for Scientists," "Territorial Claims in Antarctica," "Antarctica -- a Source of Profits to Monopolies," and "Antarctica Should be Used Only for Peaceful Purposes."

The first topic, in way of introduction, disavows some of the activities of the International Geophysical Year and International Geophysical Cooperation Programs, emphasizing Soviet activities, and provides a generalized background of geographic information.

The second topic deals with the official and semi-official territorial claims of each of the countries which have laid claim to parts of the Antarctic Continent, in every case pointing up the Soviet view of the flimsy and even ludicrous basis for such territorial pretensions. The author stresses the contentiousness and hostility caused by the conflicting claims, suggesting that these constitute a threat to peace. The priority of Russian discovery is stressed, as always. The basis for an American claim, however, is subjected to exceptionally lengthy, critical and unsympathetic review.

The third topic is the heart of this brochure and constitutes a political and military geography of Antarctica as seen through imperialistic eyes -- with an emphasis on the United States view. The author has used American sources extensively in his analysis of the imperialistic viewpoints on Antarctica. He quotes selectively the writings of such individuals as Admirals Byrd, Dufek and Byrd and General Gavigo.

The imperialists, he says, look upon Antarctica not for what its exploitation will mean for science or humanity, but from four viewpoints all strictly related to the enhancement of their economic and military power -- economically for enrichment of capitalist monopolies, and militarily for their aggressive designs against the Soviet Union and other peace-loving peoples. These viewpoints, which the author has attempted to document by selective quotes from American generals, admirals, financiers and statesmen are as follows: 1) Antarctica is an excellent training ground for military and naval forces to be used in the Arctic area; 2) Antarctica is a strategically important point for insuring control of communications in the Southern Hemisphere; 3) Antarctica would be an ideal storehouse for food and military supplies and arms; 4) Antarctica is a possible source of raw materials, especially uranium.

A mere enumeration of these four headings cannot convey the detail and ramifications which the author brings out under each point. Slevich draws a black picture of the activities and motives of the United States and other Imperialist nations, stressing and restressing that all these efforts and aspirations are directed to the aggrandizement of the monopolies and implementation of the warlike policies of the Imperialistic powers.

The fourth topic, a relatively brief call for Antarctica to be an area dedicated to peaceful purposes, finally makes mention of the International Conference on Antarctica held in Washington in December 1959 and the resulting agreement signed at that time. The author does not explain why the Imperialistic powers, whose motives he has spent so many pages in castigating in the strongest terms, would consent to sign such an agreement. Doubtlessly this brochure was largely written before that agreement was signed, but the author probably reflects Soviet opinion that the militarily and economically aggressive designs of the Imperialist powers (especially the United States) toward Antarctica remain unchanged and that adherence to the agreement is mere lip service to world public opinion.

This brochure is of no scientific interest and is of value only for providing insight into Soviet political views on the importance of the Antarctic Continent. ("Antarctica Should be a Zone of Peace," by S. B. Slevich, Leningrad, 1960, 54 pp.)

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